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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/936,912	09/19/2001	Kazuyuki Miya	L9289.01193	2881

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EXAMINER	
MILLER, BRANDON J	

ART UNIT	PAPER NUMBER
2683	5

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/936,912	Applicant(s) MIYA ET AL.	
	Examiner Brandon J Miller	Art Unit 2683	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-8 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holtzman in view of Suzuki and Siala.

Regarding claim 1 Holtzman teaches a piece of radio base station apparatus (see col. 4, lines 25-30). Holtzman teaches an interference canceller which has a plurality of sets of a processing unit (see col. 5, lines 33-39, col. 6, lines 31-33, and Fig. 3). Holtzman teaches despreading a signal for a channel (see col. 6, lines 34-38). Holtzman teaches spreading modulation of which is performed with the spreading code at the side of a communication terminal (see col. 8, lines 35-40). Holtzman teaches generating a replica signal according to ranking results (see col. 8, lines 52-60 and col. 9, lines 31-35). Holtzman teaches cancellation of replica signal generated in the processing unit from input signals into the processing unit (see col. 9, lines 35-39). Holtzman teaches replica signals that are generated and cancelled from the input signals at the same time (see col. 9, lines 31-40). Holtzman does not specifically teach despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or ranking according to the likelihood of each symbol. Suzuki teaches despreading signals for each channel of a plurality of channels with a spreading code (see abstract and col. 2, lines 5-14).

Siala teaches calculation of the probabilities of symbols which are obtained by use of unspreading signals for each channel (see col. 5, lines 56-60). Siala teaches ranking according to the likelihood of each symbol (see col. 5, lines 50-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, and ranking according to the likelihood of each symbol because this would allow for improved multi-stage interference cancellation in wireless communication systems.

Regarding claim 2 Holtzman teaches a piece of radio base station apparatus (see col. 4, lines 25-30). Holtzman teaches an interference canceller which has one or more subsets (see col. 5, lines 33-39, col. 6, lines 31-33, and Fig. 3). Holtzman teaches despreading a signal for a channel (see col. 6, lines 34-38). Holtzman teaches spreading modulation of which is performed with the spreading code at the side of a communication terminal (see col. 8, lines 35-40). Holtzman teaches generating a replica signal according to ranking results (see col. 8, lines 52-60 and col. 9, lines 31-35). Holtzman does not specifically teach each interference subset independently from each other performs ranking processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or ranking according to the likelihood of each symbol. Suzuki teaches each interference subset independently from each other, performs ranking processing and generation of replica signals (see col. 2, lines 51-55 and 3, lines 3-9). Suzuki teaches despreading signals for each channel of a plurality of channels with a spreading code (see abstract and col. 2, lines 5-14). Siala teaches

calculation of the probabilities of symbols which are obtained by use of unspreading signals for each channel (see col. 5, lines 56-60). Siala teaches ranking according to the likelihood of each symbol (see col. 5, lines 50-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include each interference subset independently from each other performs ranking processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, and ranking according to the likelihood of each symbol because this would allow for improved multi-stage interference cancellation in wireless communication systems.

Regarding claim 3 Holtzman, Suzuki and Siala teaches a device as recited in claim 2 except for a channel allocation control based on information reported from each subset so that the relations between the ranking order and likelihood are almost uniform among subsets. Suzuki does teach channel assignment based on information reported from each subset so that the relations between the ranking orders are almost uniform (see col. 4, lines 7-12 & 32-36). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include a channel allocation control based on information reported from each subset so that the relations between the ranking order and likelihood are almost uniform among subsets because this would allow for reduced multiple access interference in wireless communication systems.

Regarding claim 4 Holtzman teaches a piece of radio base station apparatus (see col. 4, lines 25-30). Holtzman teaches an interference canceller which has one or more subsets (see col. 5, lines 33-39, col. 6, lines 31-33, and Fig. 3). Holtzman teaches despreading a signal for a

channel (see col. 6, lines 34-38). Holtzman teaches spreading modulation of which is performed with the spreading code at the side of a communication terminal (see col. 8, lines 35-40). Holtzman teaches generating a replica signal according to class decision results (see col. 8, lines 52-60 and col. 9, lines 31-35). Holtzman does not specifically teach each interference subset independently from each other performs class decision processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or decision of the presence of replica signals by comparison between likelihood of each symbol and a threshold value. Suzuki teaches each interference subset independently from each other, performs ranking processing and generation of replica signals (see col. 2, lines 51-55 and 3, lines 3-9). Suzuki teaches despreading signals for each channel of a plurality of channels with a spreading code (see abstract and col. 2, lines 5-14). Suzuki teaches channel estimation using a threshold decision on combined data (see col. 2, lines 57-61). Siala teaches calculation of the probabilities of symbols which are obtained by use of unspreading signals for each channel (see col. 5, lines 56-60). Siala teaches ranking according to the likelihood of each symbol (see col. 5, lines 50-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include each interference subset independently from each other performs class decision processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or decision of the presence of replica signals by comparison between likelihood of

each symbol and a threshold value because this would allow for improved multi-stage interference cancellation in wireless communication systems.

Regarding claim 5 Holtzman teaches a device as recited in claim 4 except for controlling threshold values based on information on the current slot or information on slots just before the current slot (see col. 7, lines 27-34).

Regarding claim 6 Holtzman teaches a piece of communication terminal apparatus performing radio communication with a piece of radio base station apparatus (see col. 4, lines 25-30). Holtzman teaches an interference canceller which has a plurality of sets of a processing unit (see col. 5, lines 33-39, col. 6, lines 31-33, and Fig. 3). Holtzman teaches despreading a signal for a channel (see col. 6, lines 34-38). Holtzman teaches spreading modulation of which is performed with the spreading code at the side of a communication terminal (see col. 8, lines 35-40). Holtzman teaches generating a replica signal according to ranking results (see col. 8, lines 52-60 and col. 9, lines 31-35). Holtzman teaches cancellation of replica signal generated in the processing unit from input signals at the same time by processing unit and a subtraction section (see col. 9, lines 35-39). Holtzman teaches replica signals that are generated and cancelled from the input signals at the same time (see col. 9, lines 31-40). Holtzman does not specifically teach despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or ranking according to the likelihood of each symbol. Suzuki teaches despreading signals for each channel of a plurality of channels with a spreading code (see abstract and col. 2, lines 5-14). Siala teaches calculation of the probabilities of symbols which are obtained by use of unspreading signals for each channel (see col. 5, lines 56-

60). Siala teaches ranking according to the likelihood of each symbol (see col. 5, lines 50-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, and ranking according to the likelihood of each symbol because this would allow for improved multi-stage interference cancellation in wireless communication systems.

Regarding claim 7 Holtzman teaches a radio communication method (see col. 4, lines 25-30). Holtzman teaches despreading a signal for a channel (see col. 6, lines 34-38). Holtzman teaches spreading modulation of which is performed with the spreading code at the side of a communication terminal (see col. 8, lines 35-40). Holtzman teaches generating a replica signal according to ranking results (see col. 8, lines 52-60 and col. 9, lines 31-35). Holtzman does not specifically teach each interference subset independently from each other performs ranking processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or ranking according to the likelihood of each symbol. Suzuki teaches each interference subset independently from each other, performs ranking processing and generation of replica signals (see col. 2, lines 51-55 and 3, lines 3-9). Suzuki teaches despreading signals for each channel of a plurality of channels with a spreading code (see abstract and col. 2, lines 5-14). Siala teaches calculation of the probabilities of symbols which are obtained by use of unspreading signals for each channel (see col. 5, lines 56-60). Siala teaches ranking according to the likelihood of each symbol (see col. 5, lines 50-55). It

would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include each interference subset independently from each other performs ranking processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, and ranking according to the likelihood of each symbol because this would allow for improved multi-stage interference cancellation in wireless communication systems.

Regarding claim 8 Holtzman teaches a radio communication method (see col. 4, lines 25-30). Holtzman teaches despreading a signal for a channel (see col. 6, lines 34-38). Holtzman teaches spreading modulation of which is performed with the spreading code at the side of a communication terminal (see col. 8, lines 35-40). Holtzman teaches generating a replica signal according to class decision results performed by every subset (see col. 8, lines 52-60 and col. 9, lines 31-35). Holtzman does not specifically teach each interference subset independently from each other, performs class decision processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or decision of the presence of replica signals by comparison between likelihood of each symbol and a threshold value. Suzuki teaches each interference subset independently from each other, performs ranking processing and generation of replica signals (see col. 2, lines 51-55 and 3, lines 3-9). Suzuki teaches despreading signals for each channel of a plurality of channels with a spreading code (see abstract and col. 2, lines 5-14). Suzuki teaches channel estimation using a threshold decision on combined data (see col. 2, lines 57-61). Siala teaches calculation of the

probabilities of symbols which are obtained by use of unspreading signals for each channel (see col. 5, lines 56-60). Siala teaches ranking according to the likelihood of each symbol (see col. 5, lines 50-55). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device adapt to include each interference subset independently from each other performs class decision processing and generation of replica signals, despreading signals for each channel of a plurality of channels with a spreading code, calculation of the likelihood's of symbols which are obtained by use of despreading signals for each channel, or decision of the presence of replica signals by comparison between likelihood of each symbol and a threshold value because this would allow for improved multi-stage interference cancellation in wireless communication systems.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Toda et al. U.S Patent No. 6,192,067 discloses multistage interference cancellar.

Suzuki et al. U.S. Patent No. 6,584,115 discloses a multiuser interference canceller for DS-CDMA system.

Ide et al. U.S Patent No. 6,501,943 discloses an adaptive directivity transmission device and method.

Suzuki et al. U.S. Patent No. 6,088,383 discloses a spread-spectrum signal demodulator.

Fukawa U.S Patent No. 6,243,412 discloses an adaptive array transmitter receiver.

Whinnett et al. U.S. Patent No. 5,999,826 discloses a device for transmitter path weights and methods thereof.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brandon J Miller whose telephone number is 703-305-4222. The examiner can normally be reached on Mon.-Fri. 8:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Trost can be reached on 703-308-5318. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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August 27, 2004

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